Using ODYSSEY in the Chemistry Classroom

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What is ODYSSEY?

3D Visualization & Simulation

At the Molecular Level...Strictly!
What Does **ODYSSEY** Run On?

Available for **Windows** (since 2004)

Available for **OS X** (since 2007)

Select Teaching Units Available for the **iPad** (since 2014)

- **Student Edition**
- **Instructor’s Edition** (Includes Alignments + Answer Key)
Example 1

- Build Molecule
- Visualize
- Animate
- Calculate Electron Cloud
- Query

→ Molecular Structure

→ VSEPR
Example 2

- Build Cell
- Simulate
- Visualize
- Query
- Plot

$\text{Water} + \text{Ar} \rightarrow \text{Water–Argon}$

$\text{Argon} \rightarrow \text{Intermolecular Forces}$

$\text{Intermolecular Forces} \rightarrow \text{Gas Laws}$
Example 3

- Build Macromolecule
- Visualize
- Manipulate

→ Biomolecular Structure

→ Intermolecular Forces in Biology

Sequence

DNA
Molecular Dynamics Simulation

Easy-to-Use User Interface (Zero Jargon)

Quantum Chemistry

Introductory Chemistry Content
(Worksheets, Protocols, ~3,000 Prebuilt Models, Tutorials, Applications,...)

— Computational Chemistry in Disguise
Users

High School
Regular Chemistry / AP Chemistry

College
General Chemistry

→ About evenly split

Small, but enthusiastic following in Middle School
Teaching with

- Direct Demonstrations
  (“The Molecular Perspective”)
- Inquiry/Exploration
  (Ask Leading Questions!)
- Computer Lab Experiments
  (Complement Wet Lab)
- Take-Home Labs
- Enrichment
- Self-Study

Teacher Computer

Classroom Computers

Student Computers
• General Purpose Molecular Tool
  More than Molecular Visualization: Building, Manipulating, Analyzing

• Virtual Lab (But Not Simulated-Glassware)
  Generation of Lab-Like, Imperfect (!) Data at the Molecular Level

• Explicitly Science-Based (Coulomb, Newton, Schrödinger)
  Provide a Realistic Idea About the Molecular World (“Giant Microscope”)

• Real-World Software
  Closely Related to Programs in Chemistry Research Labs All Over the World
Practices and the Next Generation Science Standards

Traditional

Content ("Memorization")

Practices ("Activities")

NGSS

Couple Practice with Content
Knowledge + Skill = question...on the AP Chem Exam!